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Do fiscal imbalances deteriorate sovereign debt ratings?

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Do fiscal imbalances deteriorate sovereign debt ratings?*

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Abstract

We use sovereign debt rating estimations from Afonso, Gomes and Rother (2009, 2010) for Fitch, Moody's, and Standard & Poor's, to assess to what extent the recent fiscal imbalances are being reflected on the sovereign debt notations. We use macro and fiscal data up to 2009, and macro and fiscal projections, to obtain the expected rating for several OECD countries. The answer to the title question is yes, but in a diverse way for each country. Our average model predictions point to a heterogeneous behaviour of rating agencies across countries.

JEL: C23; E44; G15.
Keywords: credit ratings; sovereign debt; rating agencies.

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1. Introduction

Existing studies on the determinants of sovereign ratings find that rating agencies look at several variables when attributing a rating notation: per capita income, GDP growth, inflation, external debt, level of economic development, default history, unemployment rate or the investment-to-GDP ratio (see, for instance, Cantor and Packer, 1996, Afonso, 2003, and Bissoondoyal-Bheenick, 2005). Moreover, variables that reflect how the government conducts its fiscal policy, the budget balance and government debt are also relevant. These results are particularly significant for developed economies while for emerging economies other variables such as foreign reserves, current account balance, exports or terms of trade also seem to play an important role.

Out of these variables, Afonso, Gomes and Rother (2009, 2010) have shown that four fundamental variables have a consistent short-run impact on sovereign ratings, determining roughly the rating ladder: the level of GDP per capita, real GDP growth, the public debt level and the government budget balance. In addition to undermining economic growth, as shown by Reinhart and Rogoff (2010), it seems reasonable to think that high fiscal imbalances can increase the likelihood of sovereign defaults.

In this study we use the estimated models for sovereign debt rating from Afonso, Gomes and Rother (2009, 2010), for Fitch, Moody's, and Standard & Poor's (S&P), to assess to what extent the deterioration of fiscal imbalances since 2008 in several OECD countries is being reflected on the sovereign debt ratings. For that purpose we use macro and fiscal data up to 2009, and macro and fiscal projections, to make a prediction for the expected rating for several OECD countries up until 2011 (the countries covered in the analysis are: Canada, France, Germany, Greece, Ireland, Italy, Japan, Portugal, Spain, the U.K., and the U.S.).

The answer to the title question seems to be yes, but in a diverse way for each country. We find that most of the deterioration of sovereign creditworthiness over the past two year is due to the increase of government deficits and debt, rather then the poor economic performance. Moreover, our rating predictions point to an under rating of Greece, Ireland and Portugal relative to the average country prediction. On the other hand, the rating agencies seem to be more lenient with Japan, UK, US and, although to a lesser extent, with France and Italy.

The paper is organised as follows. In Section Two we explain the methodology followed by Afonso, Gomes and Rother (2010) and summarise their results. In Section

Three we conduct the forecast of the ratings for each country and discuss its results. Section Four summarises the paper's main findings.

2. Methodology

Afonso, Gomes and Rother (2010) initially estimated rating models for a panel of 130 countries for the period 1995-2005, using both linear estimation methods and ordered response models. The detailed results and data description are reported in Afonso, Gomes and Rother (2010).

Linear estimation: random effects

The equation to estimate by random effects is

$$R_{it} = \beta(X_{it} - \overline{X}_i) + (\eta + \beta)\overline{X}_i + \lambda Z_i + \varepsilon_i + \mu_{it}, \qquad (1)$$

where we have: R_{it} – quantitative variable, obtained by a linear transformation; X_{it} is a vector containing time varying variables and Z_i is a vector of time invariant variables. The time-average of the explanatory variables, $\overline{X}_i$, is also include as an additional time-invariant regressor. The index i (i=1,…,N) denotes the country, and the index t (t=1,…,T) indicates the period. Additionally, it is assumed that the disturbances μ_{it} are independent across countries and across time, and ε_i is uncorrelated with the regressors.

Equation (1) has an interesting economic interpretation. $\delta = \eta + \beta$ can be interpreted as a long-term effect (e. g. if a country has a permanent high unemployment what is the effect on the rating) while β is a short-term effect (e. g. if a country manages to reduce unemployment this year what is the impact on the rating). This distinction is useful for policy purposes as it can tell what a country can do to improve its rating in the short to medium-term. Alternatively, we can understand δ as the coefficient of the cross-country determinants of the credit rating.

An advantage of this framework is that it allows us to estimate ε_i for each country, which would capture any unobserved characteristic of the country, which have a permanent impact on its rating.

The cardinal transformation of the ratings was done following the correspondence with the qualitative codes shown in Table 1, using a linear scale with

numerical equivalents between 1 and 17, as already used in (3). Therefore, the maximum sovereign rating takes the value 17 (corresponding to AAA for S&P and Fitch, and Aaa for Moody's) and the lower limit of one encompasses all rating notations below B- (for S&P and Fitch) and below B3 (for Moody's).[1] In the Annex we report the historical ratings since 1989 together with the estimated predictions per country for each model specification and for each rating agency.[2]

Table 1 – S&P, Moody's and Fitch rating systems and linear transformations

Characterization of debt and issuer (source: Moody's)		Rating			Linear transformation
		S&P	Moody's	Fitch	
Highest quality	Investment grade	AAA	Aaa	AAA	17
High quality		AA+	Aa1	AA+	16
		AA	Aa2	AA	15
		AA-	Aa3	AA-	14
Strong payment capacity		A+	A1	A+	13
		A	A2	A	12
		A-	A3	A-	11
Adequate payment capacity		BBB+	Baa1	BBB+	10
		BBB	Baa2	BBB	9
		BBB-	Baa3	BBB-	8
Likely to fulfil obligations, ongoing uncertainty	Speculative grade	BB+	Ba1	BB+	7
		BB	Ba2	BB	6
		BB-	Ba3	BB-	5
High credit risk		B+	B1	B+	4
		B	B2	B	3
		B-	B3	B-	2
Very high credit risk		CCC+	Caa1	CCC+	1
		CCC	Caa2	CCC	
		CCC-	Caa3	CCC-	
Near default with possibility of recovery		CC	Ca	CC	
				C	
Default		SD	C	DDD	
		D		DD	
				D	

Ordered response models

Although estimating the determinants of ratings using linear regression methods have, in general, a good predictive power, as ratings are a qualitative ordinal

[1] According to Afonso, Gomes and Rother (2010), a numerical scale between 1 and 21 further disagregating the C notations, does not singificantly change the estimation results, while we are here also more interested in the upper part of the rating spectrum.

[2] Sovereing ratings have been available since the early 1930s. A further historical view is provided, for instance, by Ratha, De, and Mohapatra (2007).

measure, ordered response models are more suited. The rating agency makes a continuous evaluation of a country's credit-worthiness, embodied in an unobserved latent variable R_{it}^{*}. The latent variable has a linear form and depends on the same set of variables as before,

$$R_{it}^{*} = \beta(X_{it} - \overline{X}_i) + \delta\overline{X}_i + \lambda Z_i + \varepsilon_i + \mu_{it}\,. \qquad (2)$$

There are several cut-off points to draw up the boundaries of each rating category, and the final rating notation is given by

$$R_{it} = \begin{cases} AAA\ (Aaa) & if \quad R_{it}^{*} > c_{16} \\ AA+\ (Aa1) & if \quad c_{16} > R_{it}^{*} > c_{15} \\ AA\ (Aa2) & if \quad c_{15} > R_{it}^{*} > c_{14} \\ \vdots & \\ < B-(B3) & if \quad c_1 > R_{it}^{*} \end{cases}. \qquad (3)$$

The parameters of equation (2) and (3), notably β, δ, λ and the cut-off points c_1 to c_{16} are estimated using maximum likelihood. As we have panel data, the generalization of ordered probit is not simple, since instead of one error term, we now have two. One possibility is to use a random effects ordered probit estimation, which considers both errors ε_i and μ_{it} to be normally distributed, and maximizes the log-likelihood accordingly. The other alternative is to perform the traditional ordered probit estimation, but considering that the error term is autocorrelated.

Summary of results

Afonso, Gomes and Rother (2010) estimated such models for the period 1995-2005. They use several variables grouped mainly in three categories: macroeconomic performance (log of GDP per capita PPP, GDP growth, unemployment rate, inflation rate), government variables (government debt, fiscal balance and a measure of government effectiveness) and external variables (foreign reserves, current account balance and external debt).

As already mentioned, in this paper we are going to focus on the contribution of the macro and the fiscal elements. Generally the set of main macroeconomic and fiscal variables that we use in this study may determine sovereign ratings as follows.

GDP per capita – positive impact on rating: more developed economies are expected to have more stable institutions to prevent government over-borrowing and to be less vulnerable to exogenous shocks.

Real GDP growth – positive impact: higher real growth strengthens the government's ability to repay outstanding obligations.

Unemployment – negative impact: a country with lower unemployment tends to have more flexible labour markets making it less vulnerable to changes in the economic environment. In addition, lower unemployment reduces the fiscal burden of unemployment and social benefits while broadening the base for labour taxation.

Inflation – uncertain impact: on the one hand, it reduces the real stock of outstanding government debt in domestic currency, leaving overall more resources for the coverage of foreign debt obligations. On the other hand, it is symptomatic of problems at the macroeconomic policy level, especially if caused by monetary financing of deficits.

Government debt – negative impact: a higher stock of outstanding government debt implies a higher interest burden and should correspond to a higher risk of default.

Fiscal balance – positive impact: large fiscal deficits absorb domestic savings and also suggest macroeconomic disequilibria, negatively affecting the rating level. Persistent deficits may signal problems with the institutional environment for policy makers.

Table 2 shows the effect on the rating of changes in the fiscal and macro variables, for the three agencies and for the three methodologies. The first conclusion is that, individually, changes in only one macro or fiscal variable have a small effect on a country's sovereign rating. For instance, a reduction in GDP growth by 3 percent only reduces a country's rating by 0.10 to 0.20 notches. However, given their interdependence, the effects should not be seen in isolation, but analysed jointly.

Table 2 – Estimated effects of fiscal and macro variables

	Fitch				S&P				Moody's			
Short-run effect of:	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg
↓ 5% GDP per capita	-0.11	-0.13	-0.12	-0.12	-0.09	-0.11	-0.09	-0.10	-0.14	-0.15	-0.12	-0.14
↓ 3% GDP growth	-0.13	-0.09	0.00	-0.07	-0.22	-0.10	-0.10	-0.14	-0.40	-0.14	-0.14	-0.23
↑ 5% Inflation	-0.01	-0.02	-0.01	-0.01	-0.04	-0.03	-0.01	-0.03	-0.01	-0.03	-0.01	-0.02
↑ 10% Gov. Debt	-0.27	-0.28	-0.25	-0.27	-0.33	-0.30	-0.48	-0.37	-0.21	-0.15	-0.21	-0.19
↑ 5% Gov. Deficit	-0.28	-0.15	-0.27	-0.23	-0.37	-0.36	-0.29	-0.34	-0.53	-0.51	-0.49	-0.51
Long run effect of:												
↑ 5% Unemployment rate	0.00	-0.10	-0.13	-0.08	-0.09	-0.14	0.00	-0.08	-0.34	-0.22	-0.17	-0.24

Note: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. Fraction of a notch: for the ordered response models, it is in fraction of the average size of the categories between BBB- and AAA.

We can also see from Table 2 that roughly the rating agencies tend to put more weight on the fiscal variables. An increase of 5 percentage points in the fiscal deficit would reduce the rating between 0.23 notches (for Fitch) and 0.5 (for Moody's). It is also possible to observe that the rating agencies give more emphasis to different variables. Moody's gives more emphasis to the government deficit, whereas S&P and Fitch focus more in government debt.

Another important element is that, although the unemployment rate does not have a short-run effect on a country's rating it has a significant long-run effect. The interpretation is that only structural unemployment seems to matter for the rating decision.

Table 3 – Summary of prediction errors

	Estimation Procedure	Observations	% Correctly predicted	% Within 1 notch *	% Within 2 notches **
Moody's	RE with ε_i	557	64.8%	95.2%	99.6%
	RE without ε_i	557	33.8%	75.6%	93.9%
	Ordered Probit	557	46.5%	79.7%	94.3%
	RE Ordered Probit	557	43.8%	75.6%	92.3%
S&P	RE with ε_i	565	69.4%	98.2%	99.6%
	RE without ε_i	565	38.2%	79.1%	95.2%
	Ordered Probit	565	46.4%	84.8%	93.8%
	RE Ordered Probit	565	38.6%	81.9%	94.3%
Fitch	RE with ε_i	481	70.5%	98.3%	99.4%
	RE without ε_i	481	36.2%	77.5%	97.5%
	Ordered Probit	481	43.5%	82.1%	95.2%
	RE Ordered Probit	553	34.5%	77.2%	93.3%

Notes: * prediction error within +/- 1 notch. ** prediction error within +/- 2 notches.

In terms of prediction, the models correctly predict the rating of 40% of the sample and more than 75% of the predicted ratings lie within one notch of the observed value (see Table 3). When we include the estimated country error ε_i, the prediction improves significantly, as it captures all unobservable country effects.

3. Rating forecasts

3.1. Forecast approach and data

In order to make our country specific forecasts we use the previous estimation results up to 2005, together with macro and fiscal data up to 2009, and notably the more recent spring 2010 projections from the European Commission, to make predictions for the annual expected ratings up to 2011.

As an example, and drawing on the results of the prediction specification, estimated by Afonso, Gomes and Rother (2010), the estimations for the changes in the ratings, using the random effects specification, are given by (4),

$$\hat{R}_{it} = \hat{\beta}_1 \Delta Ypc_{it} + \hat{\beta}_2 \Delta Y_{it} + \hat{\delta}_3 \Delta U_{it} + \hat{\beta}_4 \Delta \pi_{it} + \hat{\beta}_5 \Delta D_{it} + \hat{\beta}_6 \Delta B_{it} + \hat{R}_{it-1}, \qquad (4)$$

where *Ypc* is per capita GPD, *Y* is the real growth rate of GDP, *U* is the unemployment rate, *D* is debt-to-GDP ratio, and *B* is the government budget balance ratio. Notice that we report in (4) only the estimated coefficients of the explanatory variables for which we have available macro and fiscal forecast data for the period 2010-2011.[3]

Another important element is that the unemployment rate does not have a significant short-run effect, so instead we use the long-run coefficient, assuming that the increase in the unemployment rate is structural.[4] For the random effects, we then round the number to the nearer integer to have a rating prediction. With the ordered probit framework we estimate the value of the latent variable in a similar way, and then compare the value with the cut-points to assess the rating.

[3] For instance, the estimated coefficients for the average of the random effects specification for Moody's are given below:

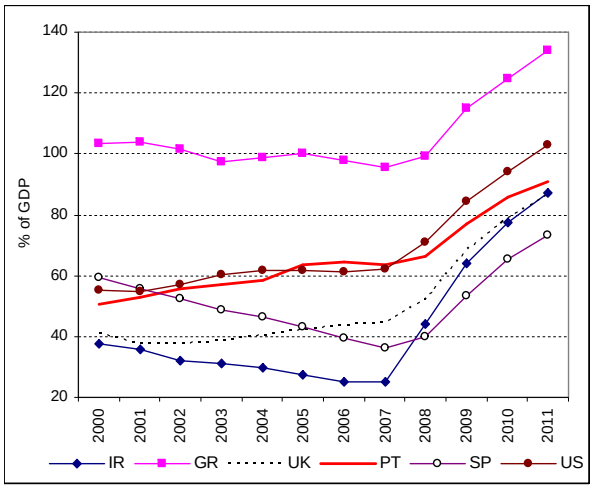
$$R_{it} = 1.789 \Delta Ypc_{it} + 8.768 \Delta Y_{it} - 0.073 * \Delta U_{it} - 0.145 * \Delta \pi_{it} - 0.014 * \Delta D_{it} + 6.991 * \Delta B_{it} + R_{it-1}.$$

[4] In practice, this only matters for the case of Spain that had an increase in the unemployment rate of around 10 percentage points. For all the other countries the isolated effect of the unemployment rate is very small.

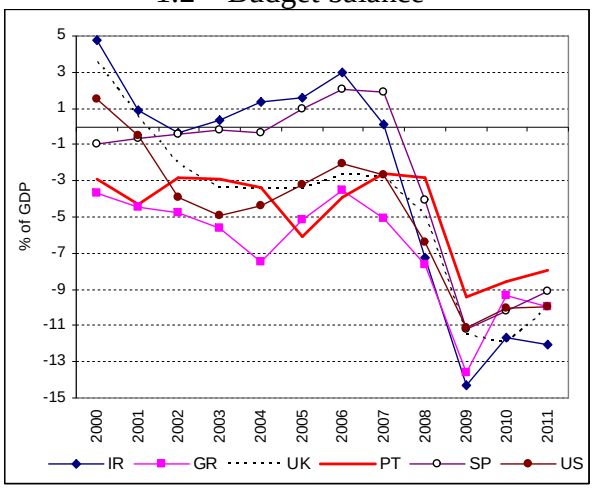
In this context, Figure 1 shows the recent developments of the government debt ratio and of the budget balance ratio for the countries under analysis, which illustrates the significant post 2007-2008 fiscal deterioration, with increasing government budget deficits and rising government indebtedness.

Figure 1 – General government debt and budget balance ratios (% of GDP)

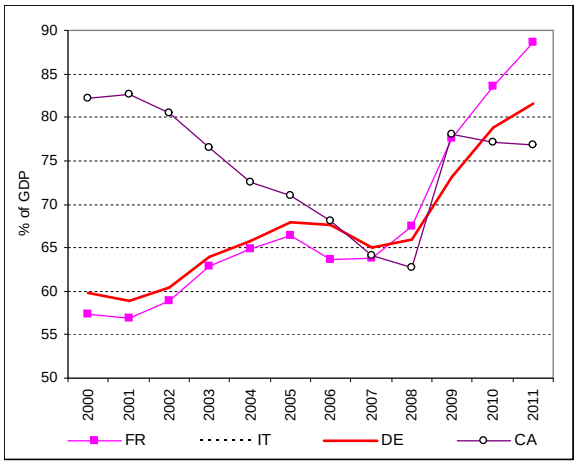
1.1 – Debt ratio



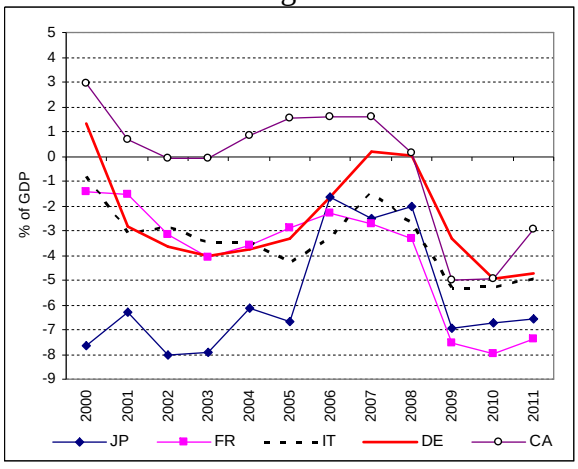
1.2 – Budget balance



1.3 – Debt ratio



1.4 – Budget balance



Source: European Commission AMECO database and spring 2010 Economic Forecasts. The debt ratio for Japan, not shown to facilitate the scale in the chart presentation, is 142% and 194% respectively in 2000 and 2011. IR - Ireland; GR - Greece, PT - Portugal, SP - Spain, FR - France, IT - Italy, DE - Germany, CA - Canada.

3.2. Country specific forecast

We report below the set of results that depict the effective country ratings, observed up until July 2010, together with the illustration of the rating prediction that we computed using the several model specifications for the three rating agencies, for each country. We also computed the predicted ratings for 2010-2011 on the basis of

the available macro and fiscal forecasts. The main results are discussed for each of the eleven OECD countries covered in our analysis (detailed information can be seen in the Annex).

Canada

The average rating prediction is in line with the effective AAA rating observed in the market on mid-June 2010 (Figure 2). Only in the case of Moody's, for the random effects model, there is some evidence of effective over rating, by one notch, in the period 2009-2010.

Figure 2 – Sovereign rating predictions for Canada

Figure 2.1

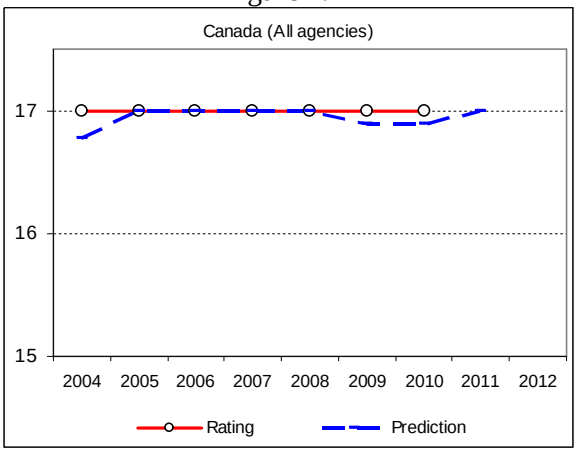


Figure 2.2

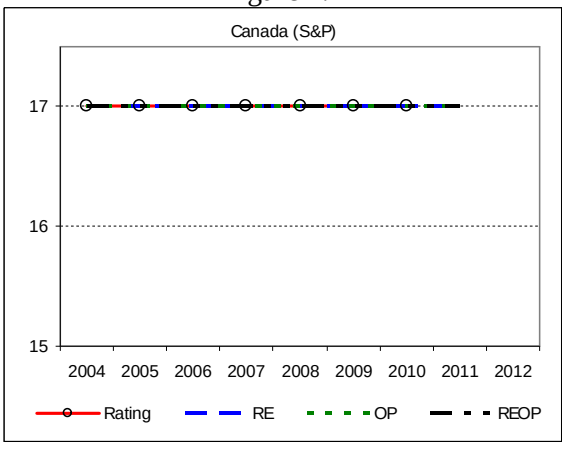


Figure 2.3

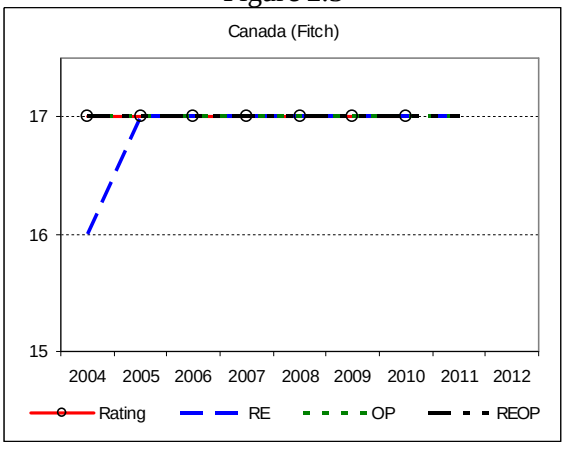
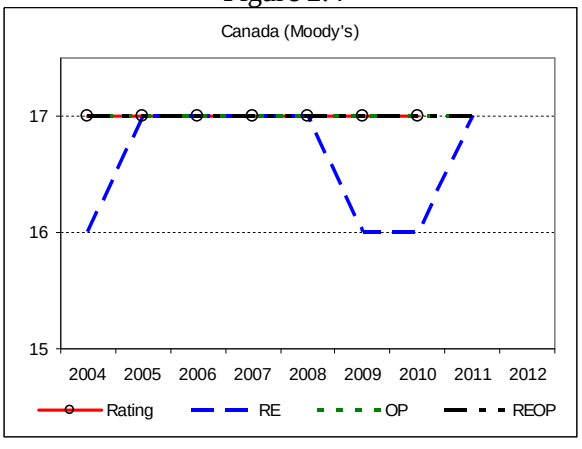


Figure 2.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

France

The overall result shows a prediction roughly half a notch bellow the triple A rating, for the period 2004-2011 (Figure 3). This is particularly the case for the estimated specifications for S&P and Fitch, while such conclusion cannot be drawn for the case of Moody's. Therefore, and taking into account the abovementioned macro and fiscal fundamentals, the prediction results point to a slight effective over rating.

Figure 3 – Sovereign rating predictions for France

Figure 3.1

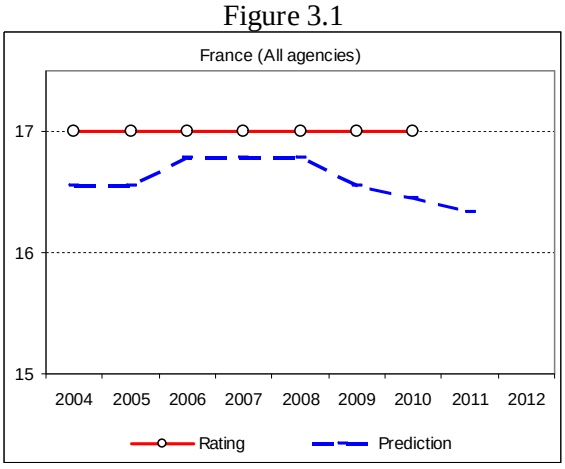


Figure 3.2

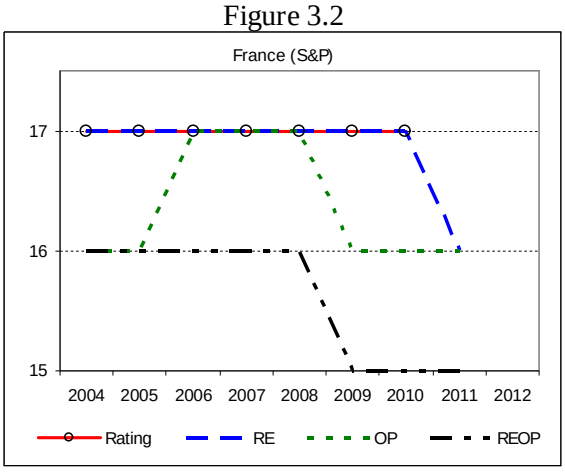


Figure 3.3

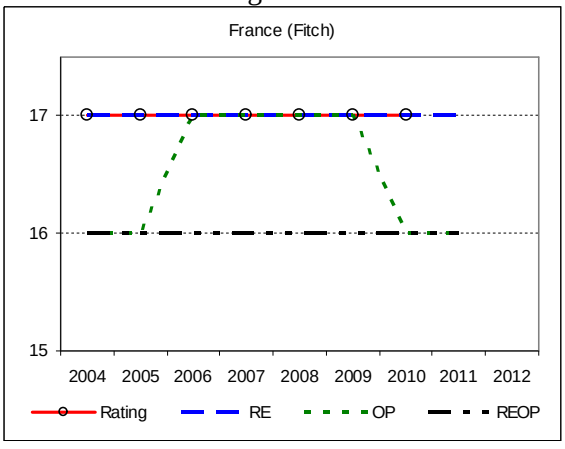
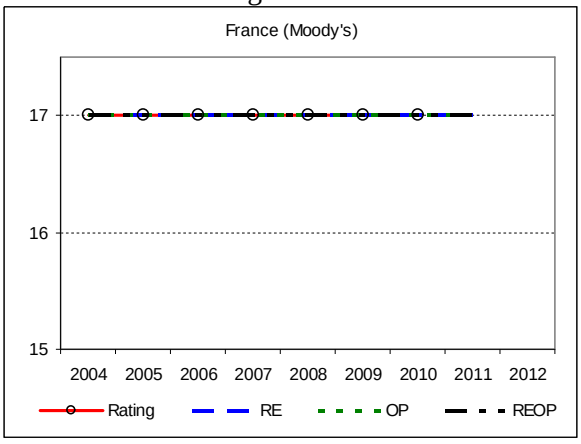


Figure 3.4



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Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

Germany

For the random ordered probit models, and for the cases of S&P and Fitch, the prediction results show a rating somewhat below triple A, but not enough to imply an effective over rating (Figure 4). However, as in the case of France, the prediction results from the three alternative specifications for the case of Moody's do not indicate a situation of effective over rating. Therefore, it seems that for the two largest euro area economies Moody's has a somewhat different (more benign) assessment than the ones that are possible to model via the historical track record for S&P and Fitch.

Figure 4 – Sovereign rating predictions for Germany

Figure 4.1

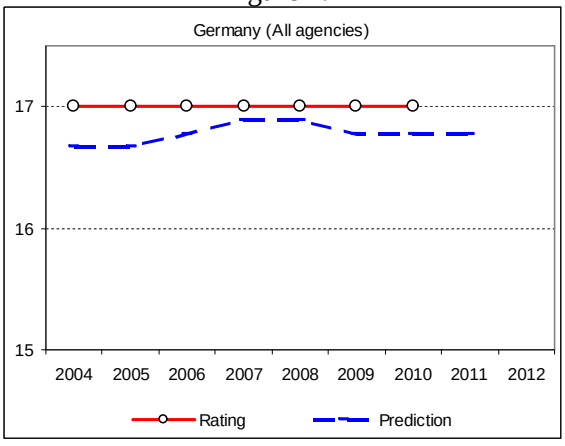


Figure 4.2

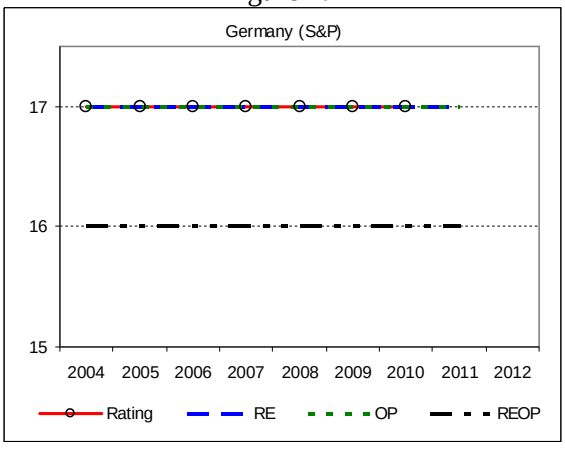


Figure 4.3

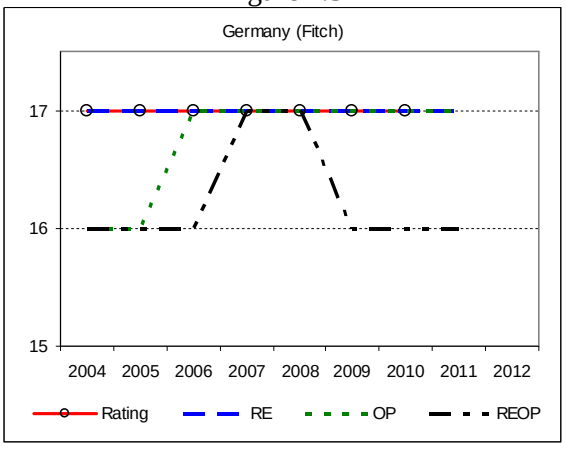
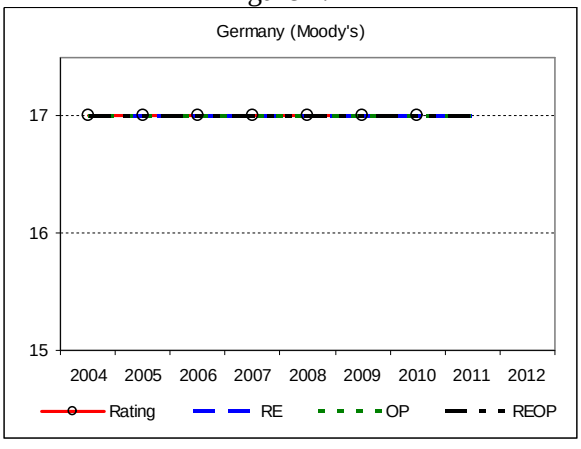


Figure 4.4



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Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

Greece

The average prediction from the three specifications and for the three rating agencies is around A for S&P and Fitch, and A2 for Moody's (Figure 5). These model predictions are above the effective rating levels observed on mid-June 2010, which ranged from BB+ for S&P to A3 for Moody's. Nevertheless, the model predictions rightly detect the downward movement in the Greek sovereign ratings from 2008 onwards, following the economic and financial crisis and the ensuing deterioration of the fiscal scenario. Since then, the model predicts a downgrade between one to four notches. However, it seems that the S&P and Moody's downgrades were much sharper than the predictions (a downgrade between 1 and 4 notches), when compared to a downgrade of two notches of Fitch. From these prediction results there seems to arise a situation of effective under rating for Greece.

Figure 5 – Sovereign rating predictions for Greece

Figure 5.1

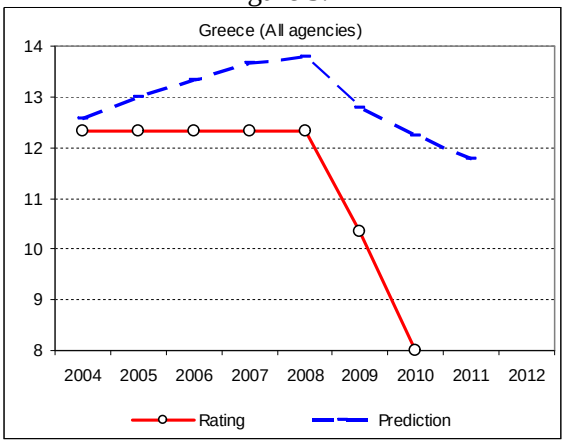


Figure 5.2

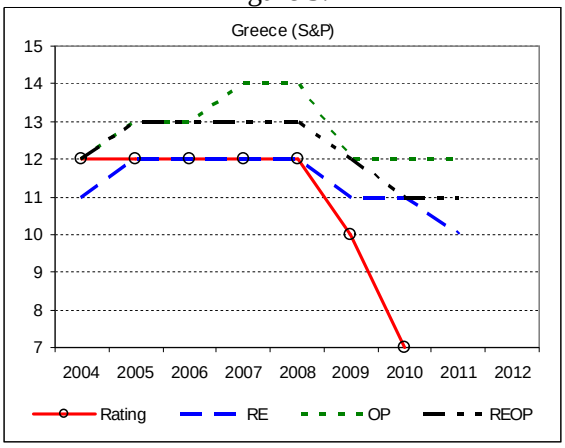


Figure 5.3

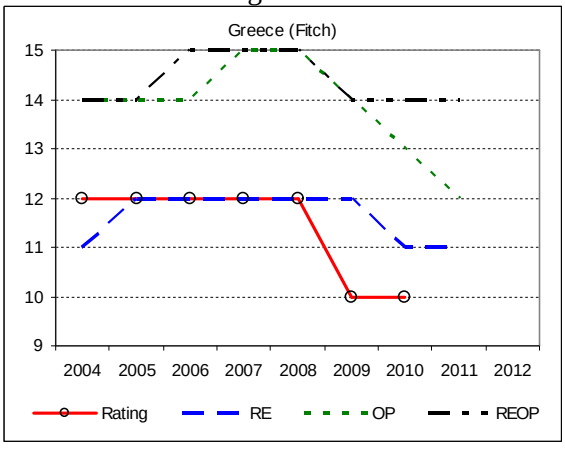
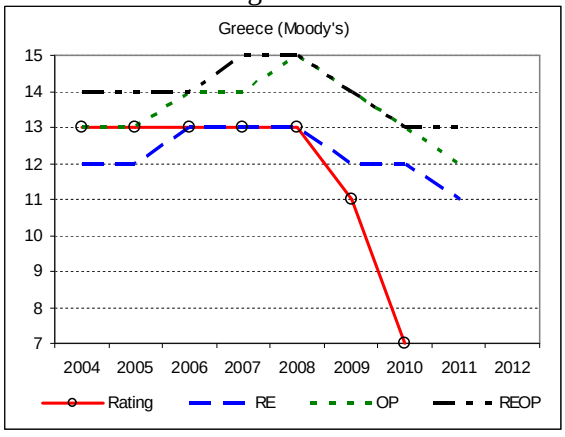


Figure 5.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

Ireland

The average rating prediction for Ireland comes out slightly above the effective rating classification in the first half of 2010 (Figure 6). Indeed, while the effective Aa2 rating from Moody's is accurately reproduced by the average of the respective model specifications, the model predictions for S&P and for Fitch are roughly on notch above the 2010 rating. These prediction results would indicate an effective under rating situation at that time. Again, the triple A ratings are correctly predicted up to 2008, and after that year the models correctly pick up the worsening of the fiscal and macro conditions.

Figure 6 – Sovereign rating predictions for Ireland

Figure 6.1

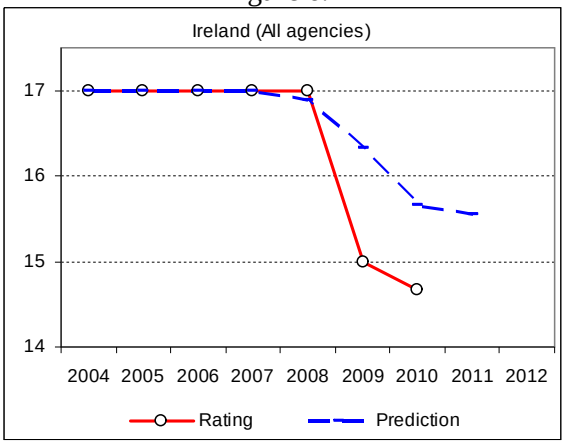


Figure 6.2

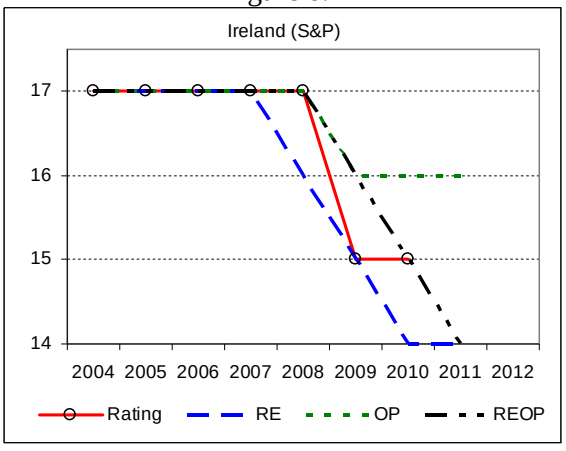


Figure 6.3

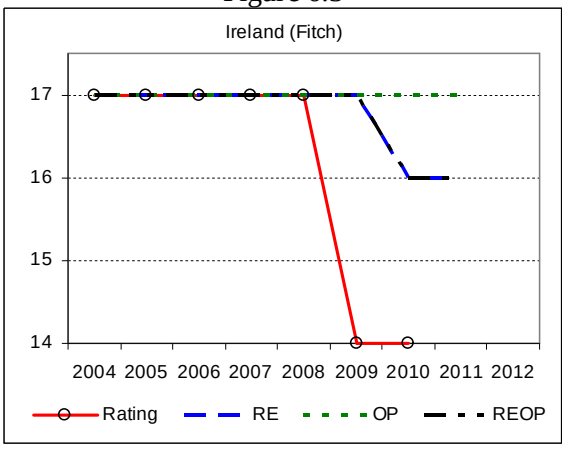
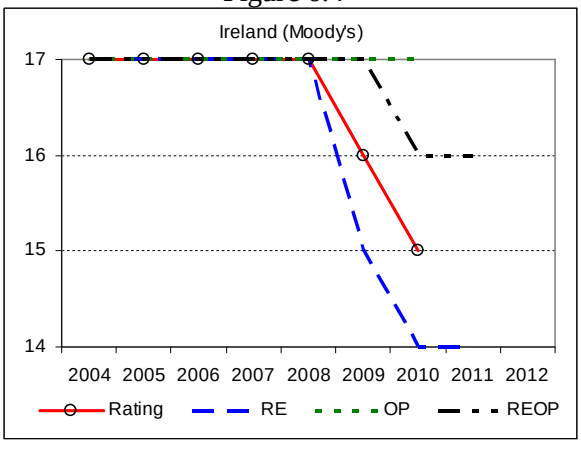


Figure 6.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

Italy

For the case of Italy the average rating predictions are somewhat below the effective rating classification on mid-June 2010 (Figure 7). At that time, the effective rating is more clearly above the rating predictions resulting from the specifications for the case of S&P (for the ordered probit and for the random effects ordered probit models). Given such estimation evidence, one could label the effective average rating as being over rated by one notch.

Figure 7 – Sovereign rating predictions for Italy

Figure 7.1

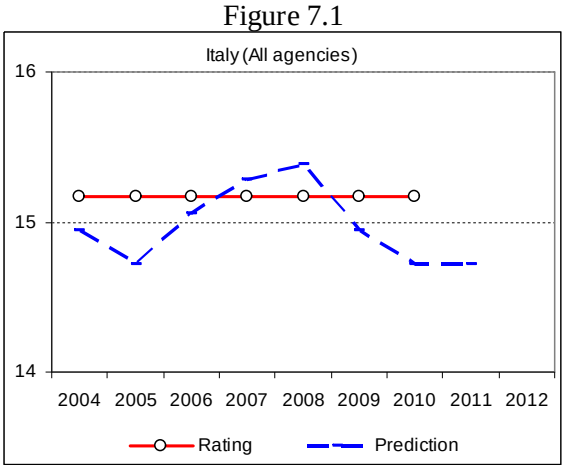


Figure 7.2

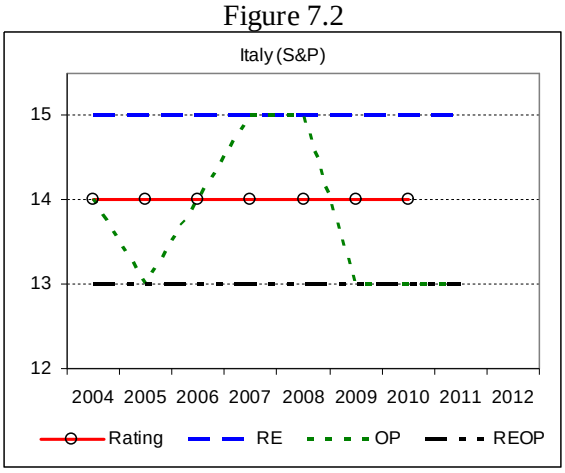


Figure 7.3

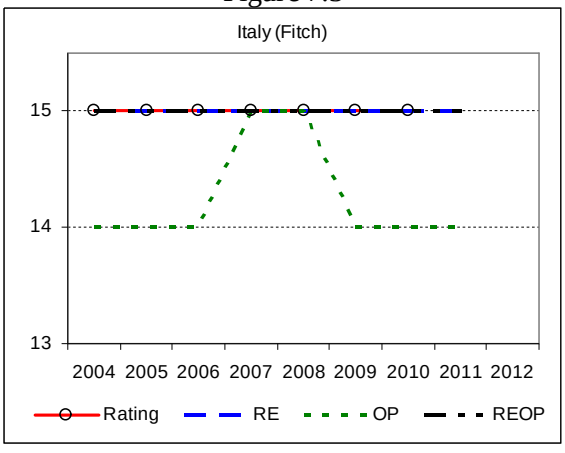
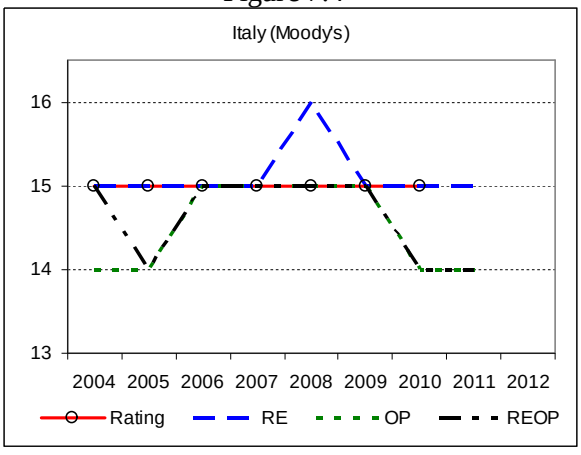


Figure 7.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

Japan

The average rating prediction for Japan is below the effective existing rating classifications on mid-June 2010 (Figure 8). Moreover, such effective over rating, of about one notch, has been also consistently picked up throughout the full prediction period, 2004-2011. These results are similar for the three rating agencies with the specification for S&P signalling even a higher effective over rating of two notches in the cases of the ordered probit and random effects ordered probit models during most of the period.

Figure 8 – Sovereign rating predictions for Japan

Figure 8.1

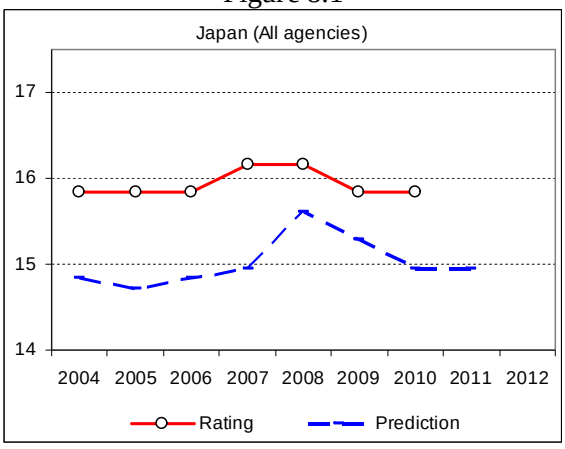


Figure 8.2

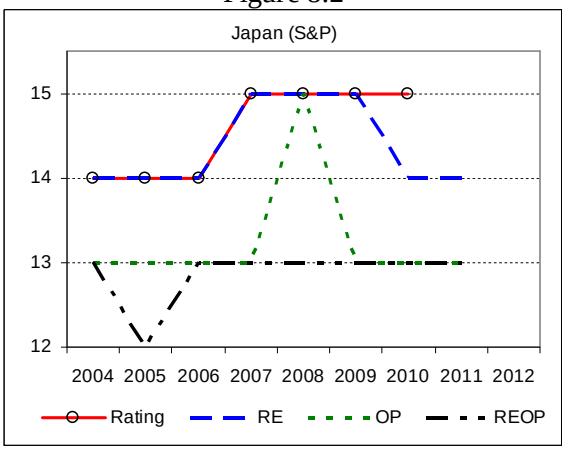


Figure 8.3

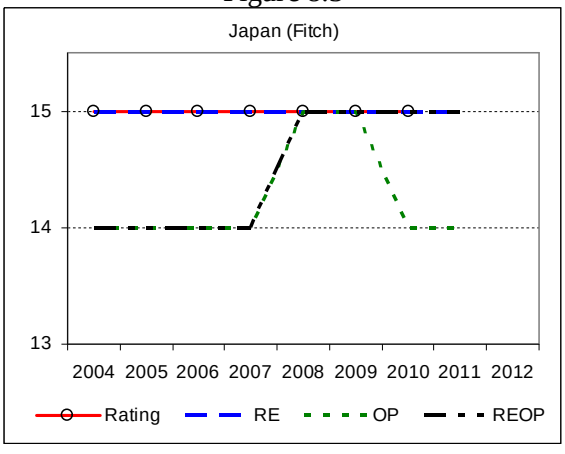
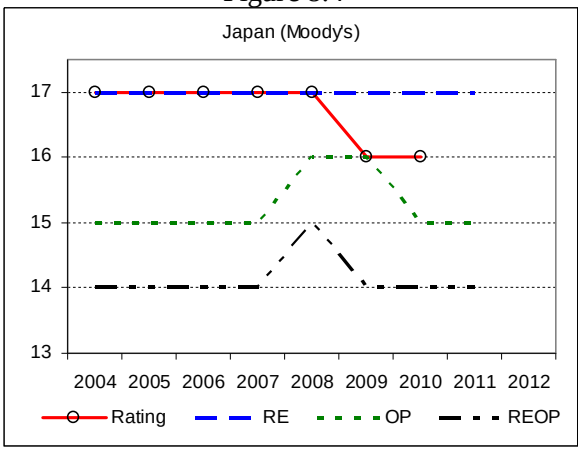


Figure 8.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

Portugal

For Portugal, the average rating prediction from the models' estimations is around two notches above the effective rating average (Figure 9). This effective rating under rating vis-à-vis the model predictions is more pronounced in the case of S&P where the deviation reaches three notches for 2010. In fact, the rating of S&P is two and three notches below respectively the Moody's and Fitch's counterpart. Again, the estimated models are able to track, on average, the recent rating downgrade, reflecting the less favourable fiscal and macro developments and their respective projections for 2010-2011 by the European Commission.

Figure 9 – Sovereign rating predictions for Portugal

Figure 9.1

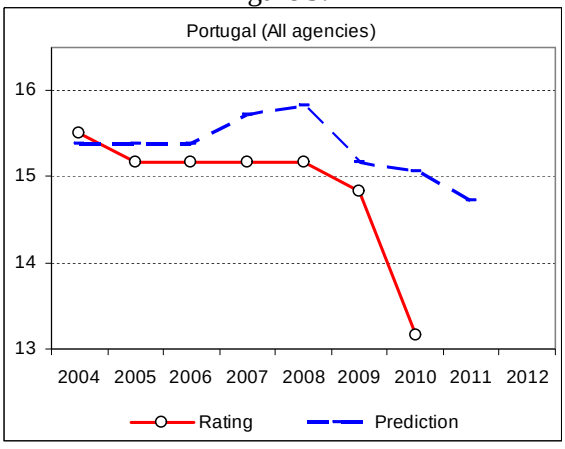


Figure 9.2

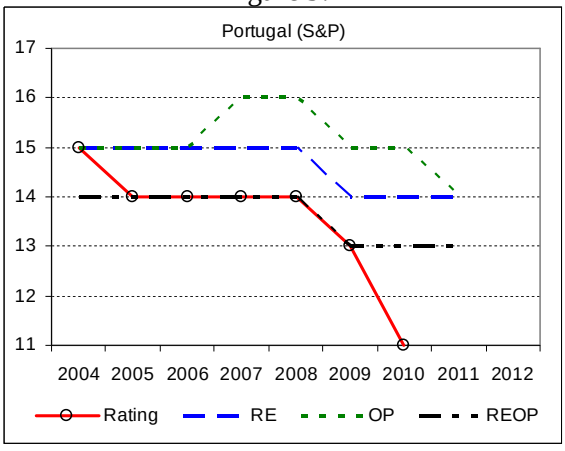


Figure 9.3

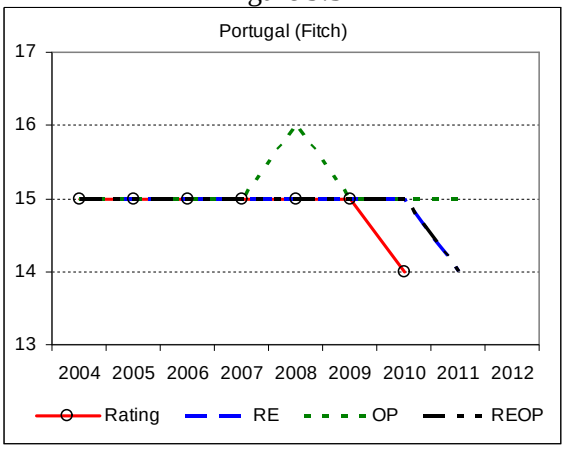
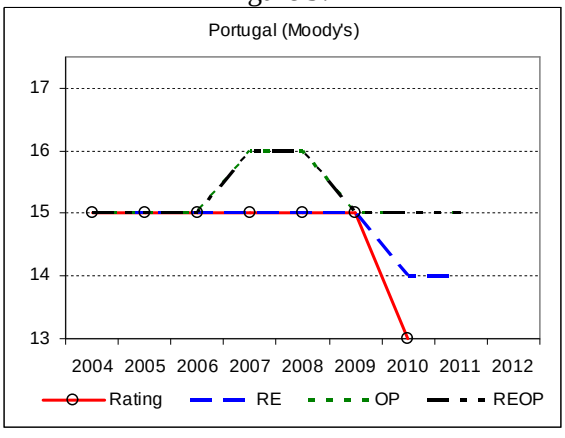


Figure 9.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

Spain

The average predictions are essentially in line with the average of the effective 2010 ratings (Figure 10). Such conclusion is also valid for the past recent years. However, it is interesting to notice that the rating predictions for the models estimated for Moody's reflect an effective over rating in 2010, of one notch, which is also estimated for 2011 (across the three specifications). Therefore, we can observe for Moody's a situation somewhat similar to the cases seen before for Germany and France.

Figure 10 – Sovereign rating predictions for Spain

Figure 10.1

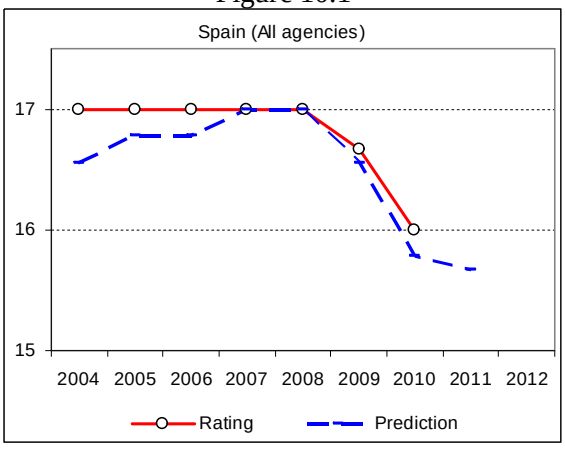


Figure 10.2

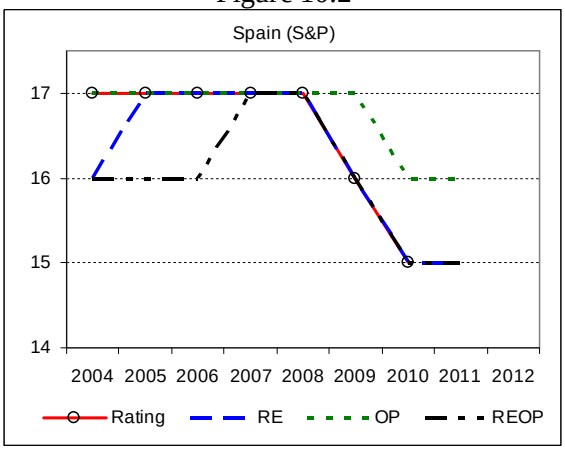


Figure 10.3

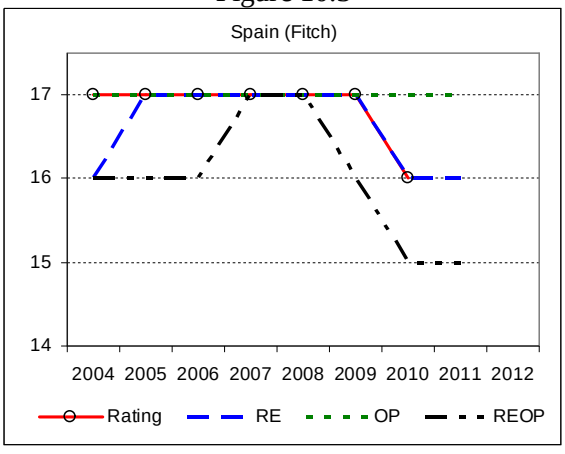
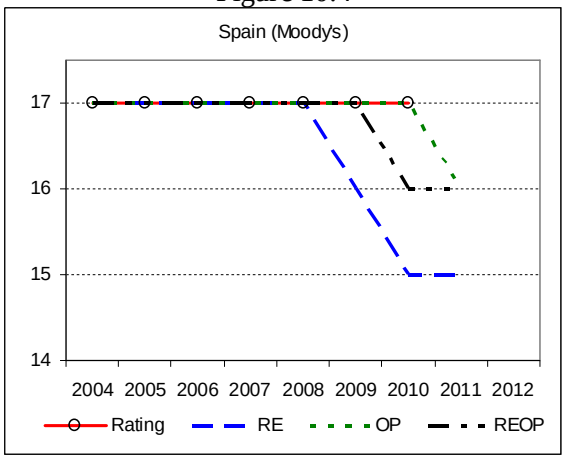


Figure 10.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

U.K.

Regarding the U.K. the averaging of the model rating predictions indicates the existence of an effective over rating of more than one notch (Figure 11). Indeed, for 2010-2011, all models produce an estimated sovereign rating below the effective 2010 rating. This difference is more relevant in the case of S&P for 2011, where the potential effective over rating could be around two notches.

Figure 11 – Sovereign rating predictions for the U.K.

Figure 11.1

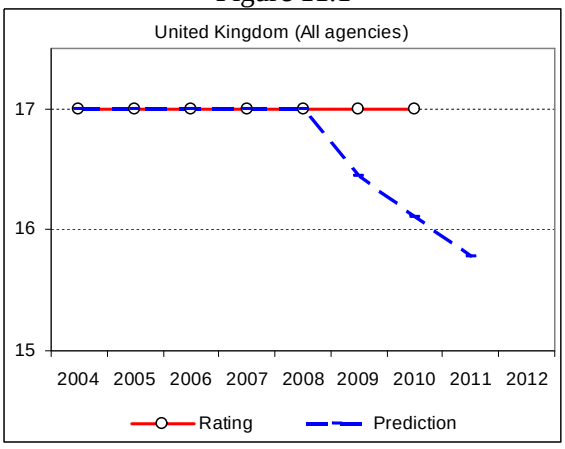


Figure 11.2

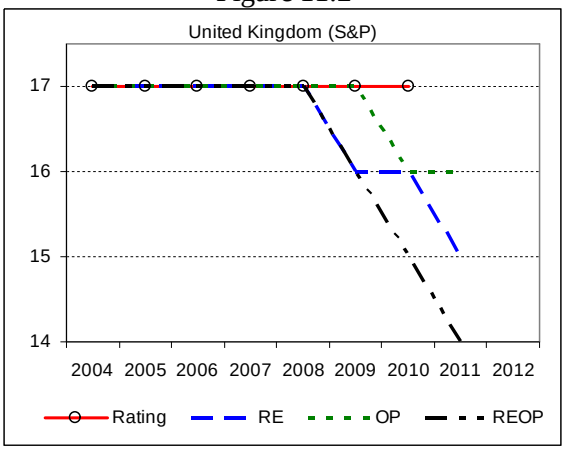


Figure 11.3

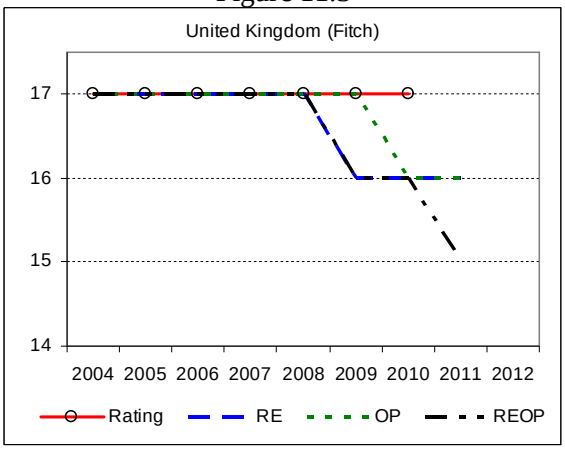
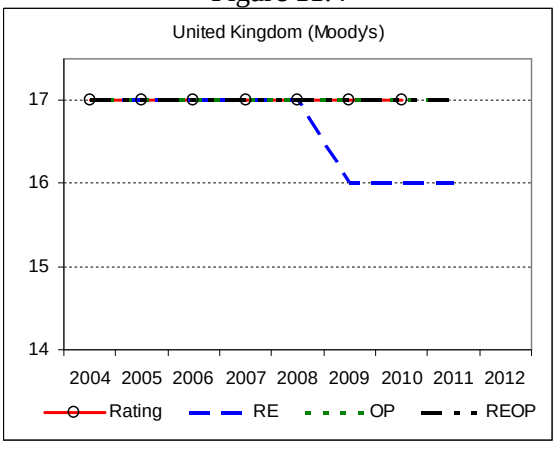


Figure 11.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

U.S.

For the case of the U.S. the average of the estimated ratings is more than one notch below the average effective rating in the beginning of 2010 (Figure 12). Such effective over rating is around two notches in the case of S&P in 2010-2011. Interestingly, the increase in the estimated effective over rating is picked up as early as 2008, although it was already possible to be tracked since 2004 for the S&P and the Fitch specifications.

Figure 12 – Sovereign rating predictions for the U.S.

Figure 12.1

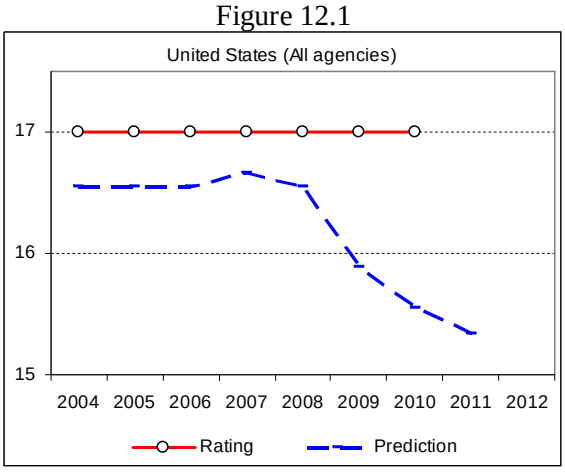


Figure 12.2

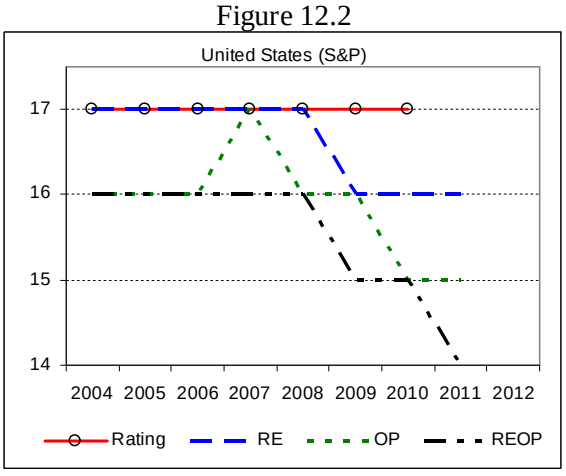


Figure 12.3

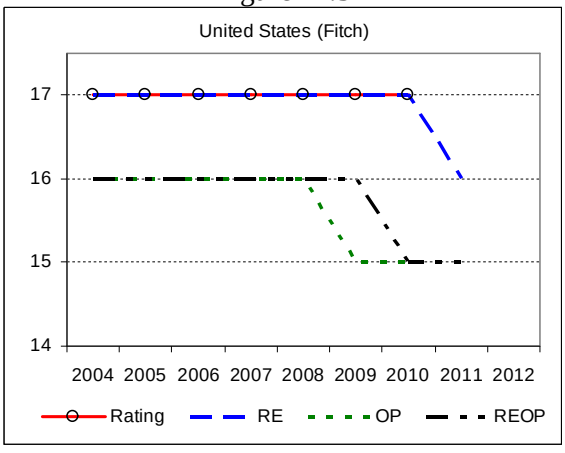
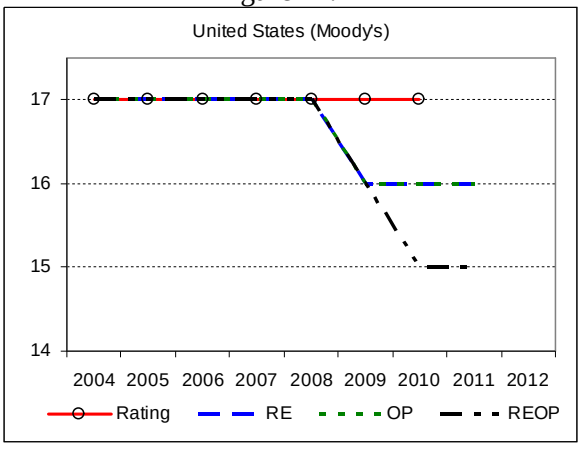


Figure 12.4



Notes: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit. 17=AAA (Aaa), …, 1= notations below B- (B3). Vertical axis – cardinal rating.

3.3. Overview of the forecast

Table 4 further summarises the deviations of the average country prediction results vis-à-vis the effective mid-June 2010 average ratings of the three rating agencies. It can be seen that for 2010 the three main rating agencies seem to be attributing too low sovereign ratings for Greece, Ireland, and Portugal, taking into account the main macro and fiscal determinants used in the model specifications used in this study. Therefore, one may see in these results some evidence of effective under rating for those countries. On the other hand, the estimated prediction results point to the existence of a relative over rating vis-à-vis the average country for France, Germany, Italy, Japan, the U.K., and the U.S.

Table 4 – 3-agency average effective (mid-June) 2010 rating vis-à-vis the average model predictions

	Effective rating vis-à-vis the prediction	Notches of effective over (+) and under (-) rating
Canada	equal	0
France	above	+1
Germany	equal	0
Greece	below	-4
Ireland	below	-1
Italy	above	+1
Japan	above	+2
Portugal	below	-2
Spain	equal	0
UK	above	+1
US	above	+1

Table 5 shows the importance of fiscal elements in explaining the deterioration of the ratings, as percentage of total. We can see that for most countries, the increase in government debt and in the budget deficit contributed between 60 and 100 percent to the reduction of creditworthiness.

Again, one must bear in mind that we are only using, for the prediction of the ratings, the macro and fiscal variables, in order to be able to do the corresponding forecasts for the period 2010-2011, for which we use the European Commission forecasts. Therefore, other rating determinants may actually play a role in mitigating the extent of the under rating or over rating situations reported in this study. Additionally, the model was estimated for 100 countries and was not specific to OECD countries. Other important elements might be the maturity structure of the

government debt; and the possibility that rating agencies also assess banking sector developments, which can also impinge on fiscal imbalances.[5]

Table 5 – Contribution of fiscal elements (2008-2011), % of total

	Fitch				S&P				Moody's				Avg
	RE	OP	ROP	**Avg**	RE	OP	ROP	**Avg**	RE	OP	ROP	**Avg**	
Canada	1.14	1.17	1.13	**1.15**	1.00	1.05	1.08	**1.05**	0.89	1.05	1.03	**0.99**	1.06
France	0.80	0.72	0.76	**0.76**	0.79	0.77	0.89	**0.81**	0.60	0.66	0.72	**0.66**	0.74
Germany	0.68	0.64	0.75	**0.69**	0.69	0.72	0.80	**0.74**	0.52	0.61	0.67	**0.60**	0.68
Greece	0.74	0.66	0.72	**0.70**	0.68	0.69	0.85	**0.74**	0.45	0.54	0.62	**0.54**	0.66
Ireland	0.75	0.64	0.69	**0.70**	0.73	0.71	0.85	**0.76**	0.52	0.59	0.66	**0.59**	0.68
Italy	0.66	0.56	0.61	**0.61**	0.66	0.63	0.78	**0.69**	0.44	0.49	0.57	**0.50**	0.60
Japan	1.20	1.28	1.28	**1.25**	1.02	1.12	1.11	**1.08**	0.92	1.18	1.11	**1.07**	1.13
Portugal	0.81	0.73	0.77	**0.77**	0.80	0.78	0.89	**0.82**	0.62	0.67	0.74	**0.68**	0.76
Spain	0.77	0.63	0.68	**0.69**	0.71	0.68	0.86	**0.75**	0.49	0.57	0.64	**0.57**	0.67
UK	0.74	0.67	0.72	**0.71**	0.76	0.74	0.84	**0.78**	0.60	0.63	0.70	**0.64**	0.71
US	1.04	0.96	0.94	**0.98**	0.94	0.92	1.03	**0.96**	0.75	0.85	0.89	**0.83**	0.92

Note: RE - Random Effects; OP - Ordered Probit; REOP - Random Effects Ordered Probit.

Finally, the relevance of the sovereign rating notations can also be summarised in terms of the additional basis points that a sovereign issuer would have to pay, on average, above the triple A rating. Such additional premium is reported in terms of basis points in Table 6, where the end of the year yields and ratings were used. For instance, it is possible to observe that BBB rated sovereigns ended up paying in the past, and on average, around 300 basis points more than an AAA issuer.

Table 6 – Average yield spread of government bonds over sovereign AAA bonds (1996-2009)

Rating	**AAA**	**AA+**	**AA**	**AA-**	**A+**	**A**	**A-**	**BBB+**	**BBB**	**BBB-**
Basis points	0	8	3	29	71	100	159	275	312	297

Source: Reuters and for the yields and own calculations.
Note: countries included are Belgium, Germany, Ireland, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Finland, Malta, Denmark, United Kingdom, Bulgaria, Czech Republic, Hungary, Latvia, Poland, Sweden, United States, and Canada. Japan was dropped form the calculation due to the fact that rather low yields would generate sometimes marginally negative spreads.

4. Conclusion

We used the estimated ordered response models for sovereign debt rating from Afonso, Gomes and Rother (2009, 2010), for Fitch, Moody's, and Standard & Poor's,

[5] Gerlach, Schulz and Wolff (2010) argue that when financial markets perceive a larger risk that governments will need to rescue banks, by increasing government debt, this negatively impinges on sovereign risk.

to assess to what extent the recent fiscal imbalances in several OECD countries are being reflected on the sovereign debt notations. For that purpose we use macro and fiscal data up to 2009, and macro and fiscal projections for 2010-2011, to compute the expected sovereign ratings for eleven OECD countries.

When computing the predicted sovereign ratings we used, for each country, and for each of the three rating agencies, three different estimations methods: random effects, ordered probit, and random effects ordered probit. In that way, we are able to gain more robustness for the calculations by averaging all the rating predictions to compare with the effective rating notation.

According to our results, we observe an overall downgrading in sovereign debt ratings from the computed predictions in the period 2009-2011. Therefore, fiscal worsening, together with less optimistic macro scenarios are indeed translated into lower sovereign ratings. The importance of the fiscal variables, government debt and fiscal deficit, to explain the deterioration of the sovereign ratings, is between 60 and 100 percent of the reduction of creditworthiness.

However, the response has not been homogeneous across rating agencies. The rating predictions that we computed also point to a relative over rating vis-à-vis the average country of France, Italy, Japan, U.K. and U.S. of around one and two notches. On the other hand, a relative average under rating in the cases of Greece, Ireland and Portugal was uncovered, ranging between one and four notches.

How can we explain this asymmetry? These predictions came from a model estimated for 60 countries, so they reflect the behaviour of agencies when rating an average country. These differences can be explained if agencies are looking at other variables that are more relevant now, such as the stability of the financial system, the maturity structure of debt or other political factors. One can envisage that for the average under rated country, the agencies seem to see a worse medium-term outlook not reflected in the current projection of fundamentals, while for the average over rated country, rating agencies may be expecting a return to more normal fiscal and macro conditions in the medium- term. On the other hand, rating agencies could be keener to attribute higher ratings in boom times, when investor's trust on the economy tends to rise, and the risk of rating misspecification is lower for the agencies' reputation (see Bolton, Freixas and Shapiro, 2009).

However, we cannot exclude that some of the effective sovereign ratings may also be prompted by an overall increase in risk aversion that trickled down to country specific ratings.

All in all, governments need to be aware of the importance of sound fiscal policies in order to decrease the risk perception of capital markets and investors vis-à-vis their levels of government indebtedness.

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Annex – Rating history and predictions

Table A1 – Canada

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AAA	Aaa		17	17														
1990		AAA	Aaa		17	17														
1991		AAA	Aaa		17	17														
1992		AA+	Aaa		16	17														
1993		AA+	Aaa		16	17														
1994	AA	AA+	Aa1	15	16	16														
1995	AA	AA+	Aa2	15	16	15														
1996	AA	AA+	Aa2	15	16	15	15.3	15	15	15	15.0	15	15	15	15.0	15	15	15	15.0	15.0
1997	AA	AA+	Aa2	15	16	15	15.3	15	15	15	15.0	16	16	16	16.0	15	15	16	15.3	15.4
1998	AA	AA+	Aa2	15	16	15	15.3	15	15	16	15.3	16	16	16	16.0	16	16	16	16.0	15.8
1999	AA	AA+	Aa2	15	16	15	15.3	16	15	16	15.7	16	16	16	16.0	16	16	17	16.3	16.0
2000	AA	AA+	Aa1	15	16	16	15.7	16	15	16	15.7	17	16	16	16.3	16	17	17	16.7	16.2
2001	AA+	AA+	Aa1	16	16	16	16.0	16	15	16	15.7	16	16	16	16.0	16	17	17	16.7	16.1
2002	AA+	AAA	Aaa	16	17	17	16.7	16	16	16	16.0	17	16	16	16.3	16	17	17	16.7	16.3
2003	AA+	AAA	Aaa	16	17	17	16.7	16	16	17	16.3	17	17	17	17.0	16	17	17	16.7	16.7
2004	AAA	AAA	Aaa	17	17	17	17.0	16	17	17	16.7	17	17	17	17.0	16	17	17	16.7	16.8
2005	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2006	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2007	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2008	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2009	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	16	17	17	16.7	16.9
2010	AAA	AAA	Aaa	17	17	17	17.0	16	17	17	16.7	17	17	17	17.0	16	17	17	16.7	16.8
2011								16	17	17	17	17	17	17	17	16	17	17	17	16.8

Table A2 – France

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AAA			17															
1990		AAA			17															
1991		AAA			17															
1992		AAA	Aaa		17	17														
1993		AAA	Aaa		17	17														
1994	AAA	AAA	Aaa	17	17	17														
1995	AAA	AAA	Aaa	17	17	17														
1996	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
1997	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
1998	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
1999	AAA	AAA	Aaa	17	17	17	17.0	17	15	15	15.7	17	16	16	16.3	17	17	17	17.0	16.3
2000	AAA	AAA	Aaa	17	17	17	17.0	17	15	15	15.7	17	16	15	16.0	17	16	17	16.7	16.1
2001	AAA	AAA	Aaa	17	17	17	17.0	17	15	15	15.7	17	16	15	16.0	17	17	17	17.0	16.2
2002	AAA	AAA	Aaa	17	17	17	17.0	17	16	15	16.0	17	16	15	16.0	17	17	17	17.0	16.3
2003	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	15	16.0	17	17	17	17.0	16.4
2004	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
2005	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
2006	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2007	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2008	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2009	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	16	15	16.0	17	17	17	17.0	16.6
2010	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	15	16.0	17	17	17	17.0	16.4
2011								17	16	16	16	16	16	15	16	17	17	17	17	16.3

Table A3 – Germany

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AAA	Aaa		17	17														
1990		AAA	Aaa		17	17														
1991		AAA	Aaa		17	17														
1992		AAA	Aaa		17	17														
1993		AAA	Aaa		17	17														
1994	AAA	AAA	Aaa	17	17	17														
1995	AAA	AAA	Aaa	17	17	17														
1996	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	17	17.0	17	17	17	17.0	16.9
1997	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
1998	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
1999	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2000	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	17	16	16.7	17	17	17	17.0	16.7
2001	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	17	16	16.7	17	17	17	17.0	16.7
2002	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	17	16	16.7	17	17	17	17.0	16.7
2003	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2004	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	17	16	16.7	17	17	17	17.0	16.7
2005	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	17	16	16.7	17	17	17	17.0	16.7
2006	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2007	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	16	16.7	17	17	17	17.0	16.9
2008	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	16	16.7	17	17	17	17.0	16.9
2009	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2010	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2011								17	17	16	17	17	17	16	17	17	17	17	17	16.8

Table A4 – Greece

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		BBB			9															
1990		BBB-			8															
1991		BBB-			8															
1992		BBB-			8															
1993		BBB-			8															
1994		BBB-			8															
1995	BBB-	BBB-		8	8															
1996	BBB-	BBB-	Baa1	8	8	10	8.7	11	12	12	11.7	10	11	11	10.7	11	12	13	12.0	11.4
1997	BBB	BBB-	Baa1	9	8	10	9.0	11	11	12	11.3	10	11	11	10.7	11	11	13	11.7	11.2
1998	BBB	BBB	Baa1	9	9	10	9.3	11	12	12	11.7	11	12	11	11.3	12	13	13	12.7	11.9
1999	BBB+	A-	A2	10	11	12	11.0	11	12	13	12.0	11	12	12	11.7	12	13	13	12.7	12.1
2000	A-	A-	A2	11	11	12	11.3	10	11	12	11.0	11	12	11	11.3	12	12	13	12.3	11.6
2001	A	A	A2	12	12	12	12.0	11	11	12	11.3	11	12	11	11.3	12	11	13	12.0	11.6
2002	A	A	A1	12	12	13	12.3	11	12	13	12.0	11	12	12	11.7	12	12	13	12.3	12.0
2003	A+	A+	A1	13	13	13	13.0	11	12	14	12.3	11	12	12	11.7	12	13	14	13.0	12.3
2004	A	A	A1	12	12	13	12.3	11	14	14	13.0	11	12	12	11.7	12	13	14	13.0	12.6
2005	A	A	A1	12	12	13	12.3	12	14	14	13.3	12	13	13	12.7	12	13	14	13.0	13.0
2006	A	A	A1	12	12	13	12.3	12	14	15	13.7	12	13	13	12.7	13	14	14	13.7	13.3
2007	A	A	A1	12	12	13	12.3	12	15	15	14.0	12	14	13	13.0	13	14	15	14.0	13.7
2008	A	A	A1	12	12	13	12.3	12	15	15	14.0	12	14	13	13.0	13	15	15	14.3	13.8
2009	BBB+	BBB+	A3	10	10	11	10.3	12	14	14	13.3	11	12	12	11.7	12	14	14	13.3	12.8
2010	BBB+	BB+	Ba1	10	7	7	8.0	11	13	14	12.7	11	12	11	11.3	12	13	13	12.7	12.2
2011								11	12	14	12	10	12	11	11	11	12	13	12	11.8

Table A5 – Ireland

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AA-	Aa3		14	14														
1990		AA-	Aa3		14	14														
1991		AA-	Aa3		14	14														
1992		AA-	Aa3		14	14														
1993		AA-	Aa3		14	14														
1994	AA+	AA-	Aa2	16	14	15														
1995	AA+	AA	Aa2	16	15	15														
1996	AA+	AA	Aa2	16	15	15	15.3	16	15	16	15.7	15	16	15	15.3	15	16	16	15.7	15.6
1997	AA+	AA	Aa2	16	15	15	15.3	16	16	16	16.0	16	16	16	16.0	16	17	17	16.7	16.2
1998	AAA	AA+	Aaa	17	16	17	16.7	16	17	16	16.3	16	16	16	16.0	16	17	17	16.7	16.3
1999	AAA	AA+	Aaa	17	16	17	16.7	17	17	17	17.0	16	17	16	16.3	17	17	17	17.0	16.8
2000	AAA	AA+	Aaa	17	16	17	16.7	17	17	17	17.0	16	17	17	16.7	17	17	17	17.0	16.9
2001	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2002	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2003	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2004	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2005	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2006	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2007	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2008	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	16	17	17	16.7	17	17	17	17.0	16.9
2009	AA-	AA	Aa1	14	15	16	15.0	17	17	17	17.0	15	16	16	15.7	15	17	17	16.3	16.3
2010	AA-	AA	Aa2	14	15	15	14.7	16	17	16	16.3	14	16	15	15.0	14	17	16	15.7	15.7
2011								16	17	16	16	14	16	14	15	14	17	16	16	15.6

Table A6 – Italy

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AA+	Aaa		16	17														
1990		AA+	Aaa		16	17														
1991		AA+	Aa1		16	16														
1992		AA+	Aa3		16	14														
1993		AA	A1		15	13														
1994	AA	AA	A1	15	15	13														
1995	AA-	AA	A1	14	15	13														
1996	AA-	AA	Aa3	14	15	14	14.3	14	12	14	13.3	14	12	12	12.7	14	12	13	13.0	13.0
1997	AA-	AA	Aa3	14	15	14	14.3	14	12	14	13.3	14	12	12	12.7	14	12	13	13.0	13.0
1998	AA-	AA	Aa3	14	15	14	14.3	14	12	14	13.3	15	12	13	13.3	14	12	13	13.0	13.2
1999	AA-	AA	Aa3	14	15	14	14.3	14	12	15	13.7	15	12	13	13.3	14	12	14	13.3	13.4
2000	AA-	AA	Aa3	14	15	14	14.3	14	12	14	13.3	15	12	13	13.3	14	12	14	13.3	13.3
2001	AA-	AA	Aa3	14	15	14	14.3	14	12	14	13.3	15	12	13	13.3	14	13	14	13.7	13.4
2002	AA	AA	Aa2	15	15	15	15.0	14	12	15	13.7	15	13	13	13.7	14	13	14	13.7	13.7
2003	AA	AA	Aa2	15	15	15	15.0	15	14	15	14.7	15	13	13	13.7	15	14	14	14.3	14.2
2004	AA	AA-	Aa2	15	14	15	14.7	15	14	15	14.7	15	14	13	14.0	15	14	15	14.7	14.4
2005	AA	AA-	Aa2	15	14	15	14.7	15	14	15	14.7	15	13	13	13.7	15	14	14	14.3	14.2
2006	AA-	A+	Aa2	15	14	15	14.7	15	14	15	14.7	15	14	13	14.0	15	15	15	15.0	14.6
2007	AA-	A+	Aa2	15	14	15	14.7	15	15	15	15.0	15	15	13	14.3	15	15	15	15.0	14.8
2008	AA-	A+	Aa2	15	14	15	14.7	15	15	15	15.0	15	15	13	14.3	16	15	15	15.3	14.9
2009	AA-	A+	Aa2	15	14	15	14.7	15	14	15	14.7	15	13	13	13.7	15	15	15	15.0	14.4
2010	AA-	A+	Aa2	15	14	15	14.7	15	14	15	14.7	15	13	13	13.7	15	14	14	14.3	14.2
2011								15	14	15	15	15	13	13	14	15	14	14	14	14.2

Table A7 – Japan

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AAA	Aaa		17	17														
1990		AAA	Aaa		17	17														
1991		AAA	Aaa		17	17														
1992		AAA	Aaa		17	17														
1993		AAA	Aaa		17	17														
1994	AAA	AAA	Aaa	17	17	17														
1995	AAA	AAA	Aaa	17	17	17														
1996	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	15	14	15.3	16.0
1997	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	17	15	16	16.0	16	14	14	14.7	15.6
1998	AA+	AAA	Aa1	16	17	16	16.3	16	15	15	15.3	16	15	15	15.3	16	14	14	14.7	15.1
1999	AA+	AAA	Aa1	16	17	16	16.3	16	15	15	15.3	16	15	15	15.3	16	14	14	14.7	15.1
2000	AA+	AAA	Aa1	16	17	16	16.3	16	15	15	15.3	16	14	15	15.0	16	14	14	14.7	15.0
2001	AA	AA	Aa1	15	15	16	15.3	15	14	15	14.7	15	13	13	13.7	16	14	13	14.3	14.2
2002	AA	AA-	Aaa	15	14	17	15.3	15	14	14	14.3	15	13	13	13.7	16	14	13	14.3	14.1
2003	AA	AA-	Aaa	15	14	17	15.3	15	14	14	14.3	15	13	13	13.7	17	15	14	15.3	14.4
2004	AA	AA-	Aaa	15	14	17	15.3	15	14	14	14.3	14	13	13	13.3	17	15	14	15.3	14.3
2005	AA	AA-	Aaa	15	14	17	15.3	15	14	14	14.3	14	13	12	13.0	17	15	14	15.3	14.2
2006	AA	AA-	Aaa	15	14	17	15.3	15	14	14	14.3	14	13	13	13.3	17	15	14	15.3	14.3
2007	AA	AA	Aaa	15	15	17	15.7	15	14	14	14.3	15	13	13	13.7	17	15	14	15.3	14.4
2008	AA	AA	Aaa	15	15	17	15.7	15	15	15	15.0	15	15	13	14.3	17	16	15	16.0	15.1
2009	AA	AA	Aa2	15	15	16	15.3	15	15	15	15.0	15	13	13	13.7	17	16	14	15.7	14.8
2010	AA	AA	Aa3	15	15	16	15.3	15	14	15	14.7	14	13	13	13.3	17	15	14	15.3	14.4
2011								15	14	15	15	14	13	13	13	17	15	14	15	14.4

Table A8 – Portugal

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		A	A1		12	13														
1990		A	A1		12	13														
1991		A+	A1		13	13														
1992		A+	A1		13	13														
1993		AA-	A1		14	13														
1994	AA-	AA-	A1	14	14	13														
1995	AA-	AA-	A1	14	14	13														
1996	AA-	AA-	A1	14	14	13	13.7	15	14	14	14.3	14	14	13	13.7	14	15	15	14.7	14.2
1997	AA-	AA-	Aa3	14	14	14	14.0	15	15	14	14.7	15	15	13	14.3	15	15	15	15.0	14.7
1998	AA	AA	Aa2	15	15	15	15.0	15	15	15	15.0	15	15	14	14.7	15	15	15	15.0	14.9
1999	AA	AA	Aa2	15	15	15	15.0	15	15	15	15.0	15	15	14	14.7	15	15	15	15.0	14.9
2000	AA	AA	Aa2	15	15	15	15.0	15	15	14	14.7	15	15	14	14.7	15	15	15	15.0	14.8
2001	AA	AA	Aa2	15	15	15	15.0	15	15	14	14.7	15	15	13	14.3	15	15	15	15.0	14.7
2002	AA	AA	Aa2	15	15	15	15.0	15	15	14	14.7	15	15	13	14.3	15	16	15	15.3	14.8
2003	AA	AA	Aa2	15	15	15	15.0	15	15	15	15.0	15	15	14	14.7	15	15	15	15.0	14.9
2004	AA	AA	Aa2	15	15	15	15.0	15	15	15	15.0	15	15	14	14.7	15	15	15	15.0	14.9
2005	AA	AA-	Aa2	15	14	15	14.7	15	15	15	15.0	15	15	14	14.7	15	15	15	15.0	14.9
2006	AA	AA-	Aa2	15	14	15	14.7	15	15	15	15.0	15	15	14	14.7	15	15	15	15.0	14.9
2007	AA	AA-	Aa2	15	14	15	14.7	15	15	15	15.0	15	16	14	15.0	15	16	16	15.7	15.2
2008	AA	AA-	Aa2	15	14	15	14.7	15	16	15	15.3	15	16	14	15.0	15	16	16	15.7	15.3
2009	AA	A+	Aa2	15	13	15	14.3	15	15	15	15.0	14	15	13	14.0	15	15	15	15.0	14.7
2010	AA-	A-	A1	14	11	13	12.7	15	15	15	15.0	14	15	13	14.0	14	15	15	14.7	14.6
2011								14	15	14	14	14	14	13	14	14	15	15	15	14.2

Table A9 – Spain

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AA	Aa2		15	15														
1990		AA	Aa2		15	15														
1991		AA	Aa2		15	15														
1992		AA	Aa2		15	15														
1993		AA	Aa2		15	15														
1994	AA	AA	Aa2	15	15	15														AA
1995	AA	AA	Aa2	15	15	15														AA
1996	AA	AA	Aa2	15	15	15	15.0	15	15	15	15.0	16	15	15	15.3	15	15	16	15.3	AA
1997	AA	AA	Aa2	15	15	15	15.0	15	15	14	14.7	15	15	15	15.0	16	15	16	15.7	AA
1998	AA	AA	Aa2	15	15	15	15.0	16	16	15	15.7	16	16	15	15.7	16	15	16	15.7	AA
1999	AA+	AA+	Aa2	16	16	15	15.7	16	16	15	15.7	16	16	15	15.7	16	16	16	16.0	AA+
2000	AA+	AA+	Aa2	16	16	15	15.7	16	16	15	15.7	16	16	15	15.7	16	16	16	16.0	AA+
2001	AA+	AA+	Aaa	16	16	17	16.3	16	16	15	15.7	16	16	15	15.7	16	16	16	16.0	AA+
2002	AA+	AA+	Aaa	16	16	17	16.3	16	17	15	16.0	16	16	15	15.7	16	17	17	16.7	AA+
2003	AAA	AA+	Aaa	17	16	17	16.7	16	17	16	16.3	16	17	16	16.3	16	17	17	16.7	AAA
2004	AAA	AAA	Aaa	17	17	17	17.0	16	17	16	16.3	16	17	16	16.3	17	17	17	17.0	AAA
2005	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	AAA
2006	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	AAA
2007	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	AAA
2008	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	AAA
2009	AAA	AA+	Aaa	17	16	17	16.7	17	17	16	16.7	16	17	16	16.3	16	17	17	16.7	AAA
2010	AA+	AA	Aaa	16	15	17	16.0	16	17	15	16.0	15	16	15	15.3	15	17	16	16.0	AA+
2011								16	17	15	16	15	16	15	15	15	16	16	16	

Table A10 – U.K.

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AAA	Aaa		17	17														
1990		AAA	Aaa		17	17														
1991		AAA	Aaa		17	17														
1992		AAA	Aaa		17	17														
1993		AAA	Aaa		17	17														
1994	AAA	AAA	Aaa	17	17	17														
1995	AAA	AAA	Aaa	17	17	17														
1996	AAA	AAA	Aaa	17	17	17	17.0	16	16	16	16.0	16	17	16	16.3	16	17	17	16.7	16.3
1997	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	16	17	17	16.7	16.7
1998	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
1999	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2000	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	16	16.7	17	17	17	17.0	16.8
2001	AAA	AAA	Aaa	17	17	17	17.0	17	17	16	16.7	17	17	17	17.0	17	17	17	17.0	16.9
2002	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2003	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2004	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2005	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2006	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2007	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2008	AAA	AAA	Aaa	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17	17	17	17.0	17.0
2009	AAA	AAA	Aaa	17	17	17	17.0	16	17	16	16.3	16	17	16	16.3	16	17	17	16.7	16.4
2010	AAA	AAA	Aaa	17	17	17	17.0	16	16	16	16.0	16	16	15	15.7	16	17	17	16.7	16.1
2011								16	16	15	16	15	16	14	15	16	17	17	17	15.8

Table A11 – U.S.

	Rating			Rating Code				Fitch				S&P				Moody's				
Year	Fitch	SP	M	FC17	SPC17	MC17	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	RE	OP	REOP	Avg	Avg
1989		AAA	Aaa		17	17														
1990		AAA	Aaa		17	17														
1991		AAA	Aaa		17	17														
1992		AAA	Aaa		17	17														
1993		AAA	Aaa		17	17														
1994	AAA	AAA	Aaa	17	17	17														
1995	AAA	AAA	Aaa	17	17	17														
1996	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	16	15	15	15.3	16	16	16	16.0	15.8
1997	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	17	16	16	16.3	16	16	16	16.0	16.1
1998	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	17	16	16	16.3	17	16	16	16.3	16.2
1999	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	17	16	16	16.3	17	17	17	17.0	16.4
2000	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	17	16	16	16.3	17	17	17	17.0	16.4
2001	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	17	16	16	16.3	17	17	17	17.0	16.4
2002	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	17	16	16	16.3	17	17	17	17.0	16.4
2003	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	17	16	16	16.3	17	17	17	17.0	16.4
2004	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
2005	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
2006	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
2007	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	17	16	16.7	17	17	17	17.0	16.7
2008	AAA	AAA	Aaa	17	17	17	17.0	17	16	16	16.3	17	16	16	16.3	17	17	17	17.0	16.6
2009	AAA	AAA	Aaa	17	17	17	17.0	17	15	16	16.0	16	16	15	15.7	16	16	16	16.0	15.9
2010	AAA	AAA	Aaa	17	17	17	17.0	17	15	15	15.7	16	15	15	15.3	16	16	15	15.7	15.6
2011								16	15	15	15	16	15	14	15	16	16	15	16	15.3